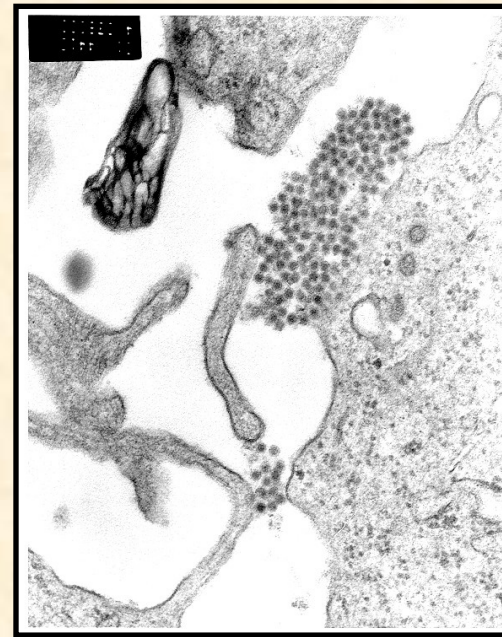
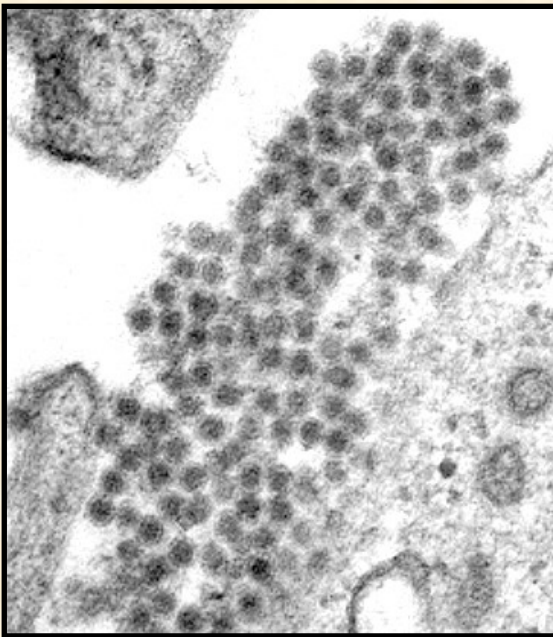




Medical NBC Briefing Series

Medical NBC Aspects of

Dengue Fever





Purpose

- *This presentation is part of a series developed by the Medical NBC Staff at The U.S. Army Office of The Surgeon General.*
- *The information presented addresses medical issues, both operational and clinical, of various NBC agents.*
- *These presentations were developed for the medical NBC officer to use in briefing either medical or maneuver commanders.*
- *Information in the presentations includes physical data of the agent, signs and symptoms, means of dispersion, treatment for the agent, medical resources required, issues about investigational new drugs or vaccines, and epidemiology.*
- *Notes page.*

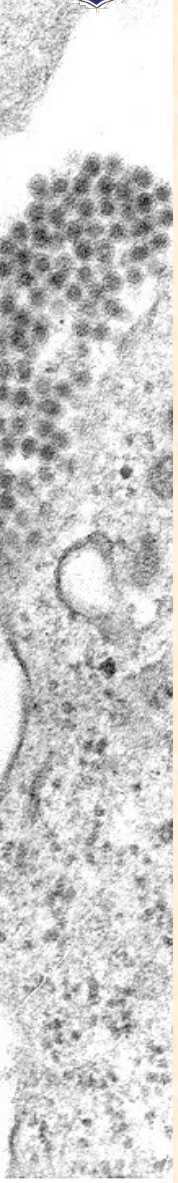


Office of the Surgeon General
for the Army



Outline

- **Background**
- **Battlefield Response**
- **Medical Response**
- **Command and Control**
- **Summary**
- **References**





Background

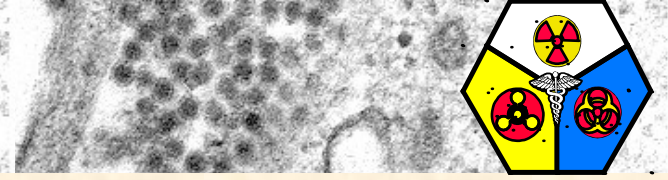
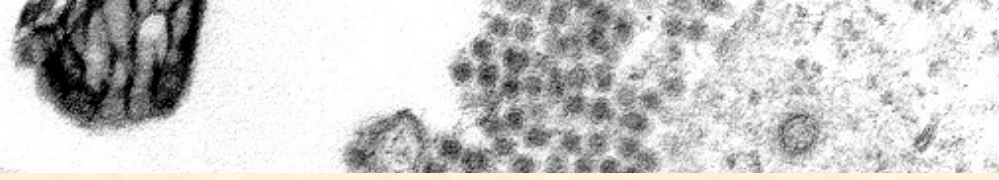
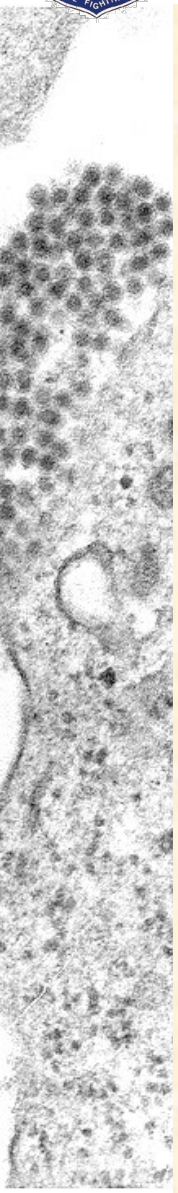
- **Disease Background**
- **Disease Course Summary**
- **Signs and Symptoms**
- **Diagnosis**
- **Treatment**
- **Current Situation**
- **Weaponization**





Disease Background

- **Virus (arbovirus genus - *Flavivirus*)**
- **Various forms of the disease to include dengue hemorrhagic fever and dengue shock syndrome**
- **Primarily a disease of the tropics**
- **Mainly transmitted by mosquito**





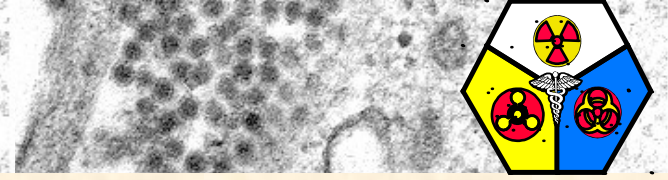
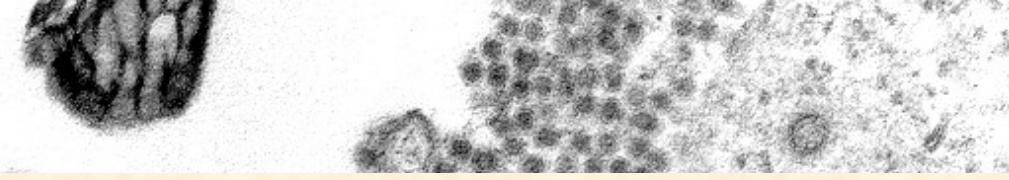
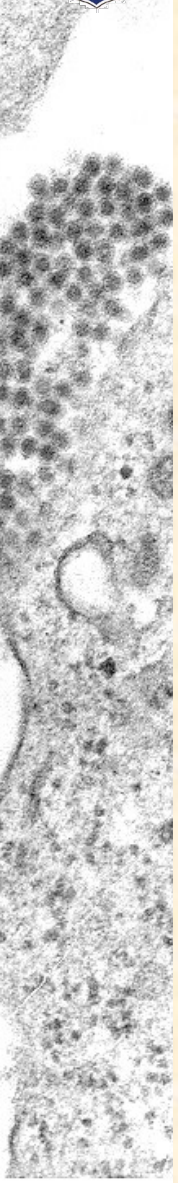
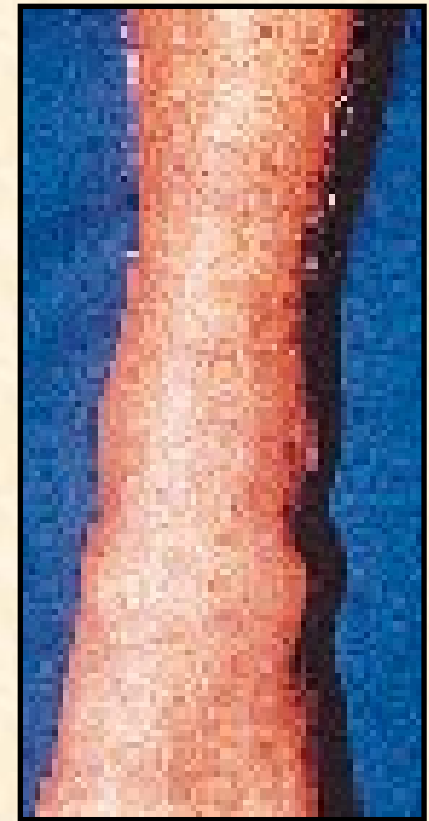
Dengue Disease Course Summary in Untreated Individuals

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
EXPOSURE	Incubation 3-5 Days		High fever, headache, etc. lasting 2 to 7 days			
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
High fever, headache, etc. lasting 2 to 7 days			Mortality rate for untreated DHF can be as high as 20%			
Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21
Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28



Signs and Symptoms

- **Fever lasting for 2 to 7 days and as high as 104 to 106 °F.**
- **Severe headache, muscle pain, joint pain, conjunctivitis, severe orbital pain, backache, anorexia, and gastrointestinal disturbances.**
- **Other symptoms may include a rash, minute reddish/purplish spots, nose bleeds, or bleeding gums.**





Diagnosis

- Sudden onset of fever, severe headache, muscle and joint pain, accompanied occasionally by a rash and hemorrhagic manifestations
- Detection of anti-dengue in im
antib





Treatment

- **Supportive care**
 - Keep patient hydrated to prevent shock
 - Hospitalization of patients with advanced symptoms
- **For complete treatment protocol refer to the following reference:**
 - Dengue hemorrhagic fever: diagnosis, treatment, prevention and control. 2nd edition. Geneva : World Health Organization. 1997.





Current Situation

World Distribution of Dengue - 2000



■ Areas infested with *Aedes aegypti*
■ Areas with *Aedes aegypti* and dengue epidemic activity

CDC



Weaponization

- **Aerosolization**
 - Highly infectious via aerosol
 - Delivery systems can be simple such a spray systems or stationary munitions
- **Vectors**
 - Naturally spread by the *Aedes aegypti* mosquito





Battlefield Response to Dengue Fever

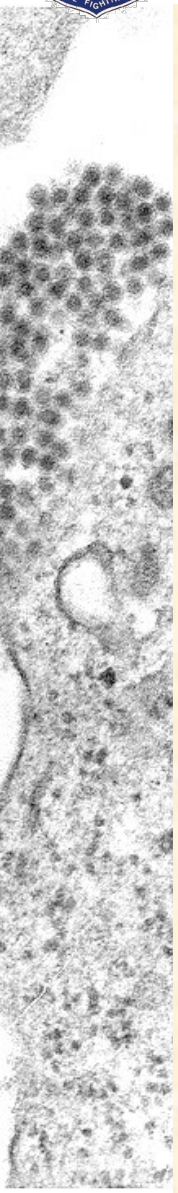
- **Detect**
 - Environmental detection
 - Clinical detection
 - Medical surveillance
- **Protect**
 - Vaccination
 - Individual protection
 - Collective protection





Detection

- **Possible methods of detection**
 - Detection of agent in the environment
 - Clinical (differential diagnosis)
 - Medical surveillance (coordination enhances detection capability)
- **Diagnosis of dengue is not presumptive of a BW attack. The disease may be endemic to the area.**





Detection of Agent in the Environment

- **Biological Smart Tickets**
- **Enzyme Linked Immunosorbant Assay (ELISA) (Fielded with the 520th TAML)**
- **Polymerase Chain Reaction (PCR) (Fielded with the 520th TAML)**





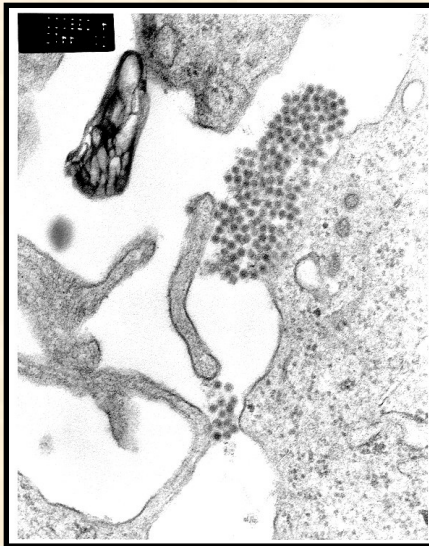
Detection of Agent in the Environment (cont.)

- M31E1 Biological Integrated Detection System (BIDS)
- Interim Biological Agent Detector (IBAD)





Clinical Detection



- **Clinical presentation**



- Sudden presentation of fever, severe headache, muscle and joint pain, accompanied occasionally by a rash and hemorrhagic manifestations

- **Laboratory confirmation**

- Division medical assets may lack lab equipment to conduct test to determine dengue
- Specimen must be sent to theater level or CONUS lab
- Contact lab prior to collection or preparation in order to assure proper methods are utilized



Detection by Medical Surveillance

 **MARYLAND ARMY NATIONAL GUARD**
DISCOM 29th Infantry Division (Light)
DIVISION MEDICAL OPERATION CENTER (DMOC) 

Patient Summary Report
29th INF (L) DIV

From: Division Medical Operations Center (DMOC)
To: Division Surgeon

Date Time Group: From: 121200RJUN99
To: 202400RJUN99

PATIENTS

Nation	WIA	NBI	Disease	Neuropsychiatric Stress-Related	Total
US	0	97	55	0	152
Allied	0	0	0	0	0
EPW	0	0	0	0	0

DISPOSITION

Return to duty	148
Holding in Division's MTFs	0
Evacuated and returned	3
Evacuated by air	0
Evacuated by ground	1
Expired en route	0
Expired in MTF	0

Clues in the daily medical disposition reports

- Large numbers of individuals presenting at the same time without natural vectors present.
- Individuals presenting with high fevers, headaches, muscle and joint pain

17 Dengue fever not endemic in June



Vaccination

- No dengue vaccine is available

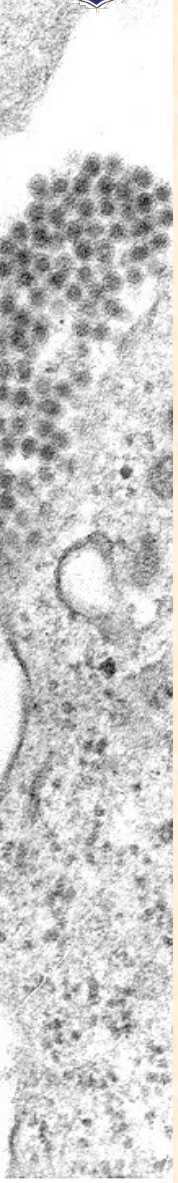


NOT AVAILABLE FOR DENGUE



Individual Protection

- **Mask and BDO with gloves and boots**
- **Standard uniform clothing affords good protection against dermal exposure to biological agents**
- **Casualties unable to wear MOPP should be handled in casualty wraps**





Collective Protection

- Hardened or unhardened shelter equipped with an air filtration unit providing overpressure
- Standard universal precautions should be employed as individuals are brought inside the collective protection units
- Dengue is communicable from person to person through vectors
- Contaminated articles can be decontaminated using 0.05% hypochlorite solution





Medical Response to Dengue Fever

- Triage and Evacuation
- Infection Control
- Resource Requirements





Triage and Evacuation

- **Triage**
 - Priorities based on severity of symptoms
 - Respiratory support, ICU needs, and quarantine facilities will increase priorities
- **Evacuation**
 - Standard infection control precautions during transport
 - May consider treatment in place for a mass casualty situation
 - Evacuation of patients will be METT-T dependent



Evacuation or Quarantine



Figure 8-6. Arms carry.

- **Evacuation**

- Dengue patients may not RTD in the normal theater evacuation policy of 15 days
- Strict interpretation of the doctrine calls for evacuation

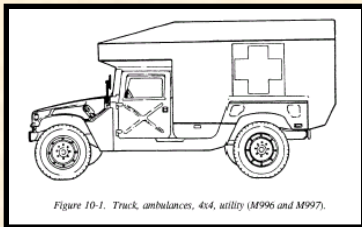


Figure 10-1. Truck, ambulances, 4x4, utility (M996 and M997).

- **Quarantine**

- Limit spread of the virus
- Unlike smallpox, dengue is already endemic to various parts of the world

- **Guidance**

- Before evacuating large numbers of patients suspected of dengue, seek guidance from CINC and MTF

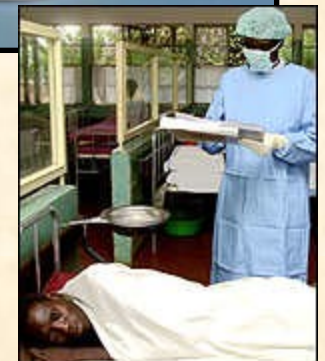
Commanders

18 Jun



Infection Control

- No reported cases of direct person-to-person transmission
- Transmitted through vectors (mosquitoes)
- Protect against vectors
- Use standard universal precautions during treatment





Resource Requirements

- **Evacuation assets**
- **Treatment facilities**
- **Supportive therapies**
 - Vigorous IV therapy
- **Intensive care facilities for severely compromised patients**
- **Vector control**
- **Possibility for in-theater treatment of large numbers of patients**

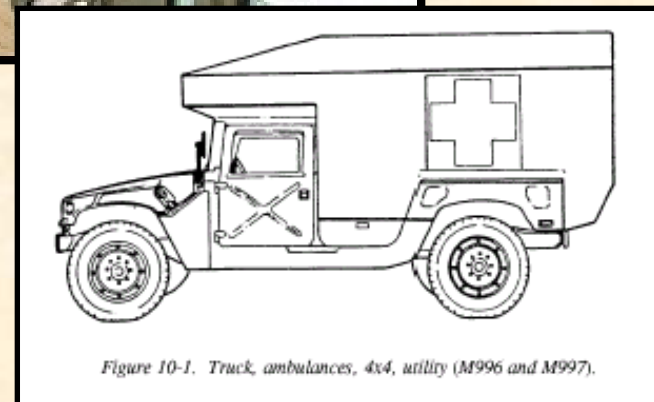


Figure 10-1. Truck, ambulances, 4x4, utility (M996 and M997).



Command and Control

- **Intelligence**
 - Medical surveillance and intelligence reports are key to keep the Command alert to the situation
- **Evacuation of the sick**
- **Maneuver**
 - Quarantine or isolation is required of symptomatic patients
- **Manpower**
 - Many soldiers may be affected by aerosol dissemination in a short period of time
- **Logistics**
 - Additional Class VIII materials will be required and evacuation routes to Echelon III will be heavily utilized
 - Specialized evacuation assets may be required



Response to Psychological Impact

- **May vary from person to person**
- **Psychological Operations**
 - Rumors, panic, misinformation
 - Soldiers may isolate themselves in fear of disease spread
- **Countermeasures**
 - LEADERSHIP is responsible for countering psychological impacts through education and training of the soldiers
 - Implementation of defensive measures such as crisis stress management teams



Summary

- **Dengue fever is endemic through large parts of the world and is transmitted by vectors.**
- **The possibility for weaponization exists.**
- **Detection may not occur until after exposure when patients are reported.**
- **Command decisions that will be required upon detection of dengue:**
 - Evacuation or treatment in-theater for large numbers of patients?
 - Evacuation: Many patients will be presenting at one time. Methods of evacuation?
 - Treatment: Procurement of additional equipment



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- Biological Warfare and Its Cutaneous Manifestations (in *Electronic Textbook of Dermatology*), T. W. McGovern and G. W. Christopher. Found at www.telemedicine.org/BioWar/biologic.htm.
- Centers for Disease Control and Prevention website: www.cdc.gov/ncidod/dvbid/dhspot98.htm.
- Dengue haemorrhagic fever: diagnosis, treatment, prevention and control. 2nd edition. Geneva : World Health Organization. 1997. Found at www.who.int/ctd/dengue/whodocs.htm
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- Department of the Army. FM 8-284: *Treatment of Biological Warfare Agent Casualties*. July 2000.
- *Medical Aspects of Chemical and Biological Warfare* (in *Textbook of Military Medicine Series Part I: Warfare, Weaponry, and the Casualty*), edited by F. R. Sidell, E. T. Takafuji, and D. R. Franz. Washington, DC: TMM Publications, 1997.



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